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Title: Connector for connecting a number of strips

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The present invention relates to a connector for detachably interconnecting a number of strips each having at least one perforation, which in at least one mutual connection position is flush with the perforations in the other strips.

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A typical connector for detachably interconnecting strips is a buckle for fastening two end parts of e.g. a perforated waist-belt or watch-belt. A great variety of different constructions of such belt buckles have been used or proposed over time.

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A simple and commonly used belt buckle consists mainly of a frame and a pin pivotably mounted on a side of the frame. One end part of the belt is fixed to the same side of the frame while the other end part is free.

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When buckling on the belt, a length of the free end part is passed through the opening of the frame. An end portion of the locking pin is thereafter inserted into a perforation of the belt.

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This operation can, however, not be carried out when the pin is in its locking position where it abuts the side of the frame opposite the fixed frame side.

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In order to insert the end portion of the locking pin into said perforation the free belt part therefore needs to be passed further through the opening of the frame until the perforation is accessible to the locking pin.

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This is inconvenient for the user since the belt tends to cut into the respective part of the users body until the belt is expanded into its desired length.

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The length of the closed part of the belt can alternatively be chosen to be so long that said inconvenience is avoided with the result, however, that the belt is not tightened

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sufficiently around the respective part of the users body in the locking position.

Variants of this simple buckle are known from the patent No. US  
5 2,554,369 and the patent No. CH 684,676.

German utility model No. 25.07.74 discloses a buckle with a frame which opening is divided into two by means of a crossbar. Perpendicularly to said crossbar is attached a locking pin  
10 which in the locking position fits into a perforation of one end part of a belt while another locking pin fits into a perforation in the other end part, thereby eliminating the above named draw back of the simple buckle.

15 A similar buckle is known from the publication DE No. 2,125,301. One end of the frame of this buckle has an opening, which allows the free end part of the belt to be introduced in the frame by turning the end part and pushing it sideways into the frame.

20 A common problem with said known buckles is that the free end part of the belt must be pulled all the way through an opening in the frame before being able to be fixed in the buckle. The known buckles are therefore troublesome to use.

25 Another problem consists in that the two end parts of the belt can only be assembled in positions where they are overlapping each other in a parallel way.

30 In one aspect according to the invention a connector is provided of the type mentioned in the opening paragraph, which has a simple construction.

In a second aspect according to the invention a connector is provided of the type mentioned in the opening paragraph, with  
35 which at least two strips easily and quickly can be detachably connected with each other.

In a third aspect according to the invention a connector is provided which is able to immediately detachably connect two or more strips in positions where co-operating perforations are flush with each other.

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In a fourth aspect according to the invention a connector is provided of the type named in the opening paragraph, which is adapted to detachably connect at least two strips with each other in both a parallel - and a non-parallel way in relation to each other.

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In a fifth aspect according to the invention a connector is provided of the type mentioned in the opening paragraph, which has no opening for passing through parts of the strips before being able to detachable connecting these with each other.

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According to the invention the connector comprises at least one pin and at least one hook attached to the at least one pin which engages the flush perforations in the strips in the connected state of these at the same time as the at least one hook is encompassing the strips, whereby the strips are detachably interconnected only by means of said at least one pin and said at least one hook.

20

By means of this simple construction the strips can easily and quickly be immediately connected with each other in positions where co-operating perforations are flush with each other and without needing to first pass a length of the strips through an opening in a frame as in the known technique.

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More specifically the hook can have at least one first hook part which is attached to the at least one pin, a second hook part extending mainly crosswise to the first hook part, and a third hook part extending in a plane mainly parallel with the plane of the first hook part, whereby the first hook part is extending, in its connecting state, at one side of the strips,

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the second hook part is extending crosswise to the edge of the strips and the third hook part is extending at the opposite side of the strips than the first hook part, whereby the hook parts can be shaped in many possible ways.

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In one embodiment the distance from the axis of the at least one pin to the second hook part can be approximately half of the width of the strips, whereby the first hook part extends approximately perpendicular to the edge of the strips.

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In another embodiment the distance from the axis of the at least one pin to the second hook parts can be larger than half of the width of the strips, whereby the first hook part forms an angle with the edge of the strips.

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The first - and third hook part can furthermore form an angle with each other.

This angle can be  $0^\circ$ , whereby the first- and third hook parts extend parallel to each other.

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When the angle, on the contrary, is larger than  $0^\circ$  the first- and third hook parts will extend in directions, which are not parallel to each other. In this case the third part, in the connected state of the strips, can form an angle with an edge of the strips when the first hook part is extending approximately perpendicular to the edge of the strips.

25

When the first hook part on the other hand forms an angle with the edge of the strips and has a sufficient length the third hook part can be turned round the axis of the pin to a position where it is free of the edges of the strips. In this position e.g. one strip can advantageously be connected and disconnected when the pin is still engaging e.g. another strip.

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The connector can in a simple embodiment have two hooks, each extending on each their side of the pin.

5 In a third embodiment the connector can have three hooks arranged in such a way that their first hook parts form an angle of  $60^\circ$  with each other thereby allowing e.g. two strips to be connected with each other in both directions which are parallel to each other and which form an angle of  $60^\circ$  with each other.

10 In a fourth embodiment the connector can have four hooks arranged in such a way that their first hook parts form an angle of  $90^\circ$  with each other thereby allowing e.g. two strips to be connected with each other in both directions which are  
15 parallel to each other and which form an angle of  $90^\circ$  with each other.

In another embodiment, each of the four hooks could have its own pin. In this embodiment, the straps would have two rows of  
20 perforations for the pins instead of just one row. The connector in this way is not limited to a single pin, but any number of pins could be used. In addition, due to the plurality of pins, the distance from the axis of the at least one pin to the second hook parts can be less than half of the width of the  
25 strips.

Per example, two strips can in a special embodiment be connected at each their side of a first hook part having two pins and two second hook parts attached at each their side  
30 whereby two third hook parts are attached to each their second hook parts.

The at least one pin can be shaped with a diameter a little larger than the diameter of the perforation and at least one  
35 mainly circumferential recess whereby the strips securely are

hold together by the pin and also are allowed to turn somewhat around the axis of the perforations.

5 The pin and hook can permanently be connected to each other. In another embodiment the pin and hook can be detachably connected with each other by means of a screw joint for permanently connecting the connector with one or more of the strips.

10 The invention will be explained in greater details below where further advantageous properties and example embodiments are described with reference to the drawings, in which

15 Fig. 1 shows in perspective one embodiment of the connector according to the invention,

Fig. 2 shows in perspective another embodiment of the connector according to the invention,

20 Fig. 3 shows in perspective a third embodiment of the connector according to the invention in open position,

Fig. 4 shows the same in closed position

25 Fig. 5 shows in perspective a fourth embodiment of the connector according to the invention in open position,

Fig. 6 shows the same in closed position,

30 Fig. 7 shows in perspective a fifth embodiment of the connector according to the invention,

Fig. 8 shows in section in a larger scale, the connector shown in fig. 1 in a double version,

35 Fig. 9 shows, seen from the side in a larger scale, an exploded view of a detail of a screw connector, and

Fig. 10 shows in perspective a seventh embodiment of the connector according to the invention.

5 The connector according to the invention is adapted to connect two or more strips of any suitable material, such as metal, rubber, plastic or leather, whereby the term strip also means the two end parts of a coherent strip.

10 The following examples of connectors are based on the assumption that they are made of brass and are used to connect two end parts of a leather waist-belt. However, the connectors according to this invention can be made of any suitable material, e.g. metal, plastic, or ceramic.

15 Fig. 1 shows a connector 1 according to the invention used for connecting two end parts 2a,b of a waist-belt 3 with perforations 4. The connector is shown in full line while the waist-belt is shown in dotted line.

20 The connector has a mainly isosceles triangular first hook part 5 with a pin 6 attached at an apex of the triangle. The distance from the axis of the pin to the third side of the triangle opposite said apex is minimum the half of the width of the belt. The normal to said third side extends about  
25 perpendicular to an edge 7 of the belt.

At the third side of the triangle the first hook part merges into a second hook part 8, which extends crosswise to the edge and merges into a third hook part 9 in the shape of an  
30 elongated piece of plate extending roughly parallel with the first hook part on all sides of the second hook part.

The two belt parts 2a,b are, when being connected, first put  
35 into a mutual overlapping position with a perforation in one end part flush with a perforation in the other one. The



perforations used are chosen to allow the waist-belt to fit comfortably around the waist of the user.

5 The connecting of the two belt parts 2a,b is then carried out by leading the two overlapping end parts 2a,b of the waist-belt 3 sideways in between the first - and third hook parts 5,8 and inserting the pin into the flush perforations 4.

10 Fig. 2 shows another embodiment of a connector 10 according to the invention, mounted on the waist-belt 3. The connector is shown in full line while the waist-belt is shown in dotted line.

15 The connector has in this case a first hook part 11 consisting of a mainly isosceles triangle 12 merging into a rectangle 13. The normal to the side of the triangle opposite the apex is extending along the row of perforations 4 while the rectangle is extending to or a little past the edge of the waist-belt where it merges into a second hook part 14, which is extending  
20 across said edge and is merging into a third hook part 15 extending in this case perpendicular to the edge 7 of the waist-belt 3. The pin 6 is attached at the apex of the triangle. The connector 10 is mounted on the waist-belt in the same way as the first embodiment of the connector.

25 Fig. 3 and 4 show a third embodiment of a connector 16 according to the invention mounted on the waist-belt 3. The connector is shown in full line while the waist-belt is shown in dotted line.

30 This connector has a first hook part 17 merging into a second hook part 18, which is merging into a third hook part 19. The pin 20 is attached to the first hook part. The distance from the pin to the second hook part is larger than the half of the  
35 width of the waist-belt 3 and the first - and third hook parts 17 and 19 are furthermore forming an angle with each other.

As the distance from the pin 20 to the second hook part 18 is larger than the half of the width of the waist-belt 3 it is possible to turn the connector 16 between the position shown in fig. 3 where the second hook part 19 is free of the edge 7 of the waist-belt 3 and the position shown in fig. 4 where the second hook part 19 is extending over the two end parts 2a,b of the belt.

10 The connector can be mounted on the waist-belt in the same way as the first - and second embodiment but advantageously by in the position shown in fig. 3 first inserting the pin 20 into the perforations 4 of the two belt end parts 2a,b and then turning the connector to the mounted position shown in fig. 4.

15 Fig. 5 and 6 show a fourth embodiment of a connector 21 according to the invention, mounted on the waist-belt 3. The connector is shown partly in full line and partly in dotted line while the waist-belt 3 is shown in full line.

20 This connector is a double version of the third embodiment of the connector 16 shown in fig.3 and 4 and has a first hook part 22 merging at the ends into two second hook parts 23, which merge into each their respective third hook parts 24. The pin 25 is attached at the middle of the first hook part, which has a length larger than the width of the waist-belt.

As the length of the first hook part 22 is larger than the width of the waist-belt 3 is it possible to turn the connector 21 between the position shown in fig. 5 where the two second hook parts 23 are free of the edge 7 of the waist-belt and the position shown in fig. 6 where the two second hook parts 23 are extending over the two belt end parts 2a,b.

30 The connector 21 is mounted on the waist-belt 3 in the position shown in fig. 5 by first inserting the pin 25 into the

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perforations 4 of the two belt end parts 2a,b and then turning the connector to the mounted position shown in fig. 6. The end parts of the third hook parts 24 are slightly bended for keeping the connector safely in the mounting position.

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Fig. 7 shows a fifth embodiment of a connector according to the invention. The connector is shown partly in full line partly in dotted line while the waist-belt 3 is shown in full line.

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In this case the connector 26 has two first hook parts 27 forming an angle of  $90^\circ$  with each other and also with the row of perforations 4 of the waist belt 3 in the mounting position of the connector.

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The first hook part has a length, which is larger than the width of the waist-belt and it is extending from one edge of this to the other one. Both of the first hook parts 27 merges into a second hook part 28 at both ends, all of which merge into each their respective third hook parts 29. The pin 30 is attached at the middle of the two first hook parts.

20

The first - and second hook parts 27 and 28 is in this case made of a round bar which has a relatively small diameter and is bent about  $90^\circ$  at the point where the two hook parts merge into each other. The third hook parts 29 are shaped like a disc attached to the end of the second hook part 28 at the centre region of the disc.

25

The connector 26 is mounted on the waist-belt 3 by inserting the pin 30 of the connector into two flushing perforations 4 of the waist-belt 3 and pressing the edges 7 of the two belt end parts 2a,b under the third hook parts 29.

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By means of this construction of the connector according to the invention the two belt end parts 2a,b can be connected either

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crosswise to each other as shown in fig. 7 or parallel to each other, (not shown).

Fig. 8 shows in section a sixth embodiment of the connector according to the invention. This connector 31 corresponds to the connector shown in fig. 1 but in a double, laterally reversed version. For identical parts the same reference numerals as used in fig. 1 are used.

10 The connector 31 has a first hook part 5 merging into two second hook parts 8, which are merging into each their respective third hook part 9. Two opposite pins 6 are attached to each their side of the first hook part 5.

15 The connector 31 is mounted on the waist-belt in the same way as the first embodiment of a connector, but with a belt end part 2a,b on each side of the first hook part 5.

As seen in fig. 8 the pin 6 is shaped with a diameter a little larger than the diameter of the perforations 4 and at least one mainly circumferential recess 32 thereby obtaining that each belt end parts 2a,b securely can be connected to the pin 6 at the same time as they are allowed to turn somewhat around the perforations in the waist-belt.

25 Pins of this type can advantageously also be used for the other embodiments of the connector according to the invention.

Fig. 9 shows in an exploded view a fraction of the connector 16 with a screw joint 33 for detachably attaching the pin 20 of the connector 16 of the fourth embodiment, shown in fig. 3 and 4, with the first hook part 17 of said connector.

30 The screw joint 33 consists of a screw 34 fixed on the first hook part 17 and a nut 35 shaped as the pin 20. One of the belt end parts 2a,b can by means of this screw joint be permanently

fixed on the connector while the other one can be detachably connected to the pin whereby the connector advantageously can serve as a buckle which in the position shown in fig. 3 can be used for fastening and unfastening the waist belt and also be  
5 turned to the mounting position shown in fig. 4.

Screw joints of this type can also advantageously be used for detachably mounting a pin on the other embodiments of the connector according to the invention.

10

In a preferred mode a pin of a connector according to the invention is inserted into the perforations from the inner side of the waist-belt, whereby the third hook part is made visible from the outside.

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Fig. 10 shows, in perspective, a seventh embodiment of the connector according to the invention. This connector 36 corresponds to the connector 26 shown in fig. 7 but with a pin 37 mounted on each of the four first hook parts 27, instead of  
20 one central pin 30. For identical parts the same reference numerals as used in fig. 7 are used. In this embodiment, the distance from the axis of the at least one pin to the second hook parts can be less than half of the width of the strips.

25 The third hook parts are, in the above described embodiments of the invention, shaped with a relatively large surface whereby the connector serves as an ornamentation of the waist-belt.

30 Within the scope of the invention the pin can also be inserted into the perforations from the outside whereby it is mainly the first hook part, which is visible from the outside of the waist-belt.

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## Claims

1. A connector for detachably interconnecting a number of strips (3) each having at least one perforation (4), which in at least one mutual connection position is flush with the perforations (4) in the other strips (3), characterized in that the connector (1,10,16,21,26,31,36) comprises at least one pin (6,20,25,30,37) and at least one hook (5,8,9;11,14,15;17,18,19;22,23,24;27,28,29) attached to the at least one pin, that the at least one pin is engaging the flush perforations in the strips in the connected state of these at the same time as the at least one hook is encompassing the strips, and that the strips are detachable interconnected only by means of said at least one pin and said at least one hook.
2. A connector according to claim 1, characterized in that the at least one hook has at least one first hook part (5,11,17,22,27) which is attached to the at least one pin (6,20,25,30,37), a second hook part (8,14,18,23,28) extending mainly crosswise to the first hook part, and a third hook part (9,15,19,24,29) extending in a plane mainly parallel with the plane of the first hook part.
3. A connector according to claim 1 or 2, characterized in that the distance from the axis of the at least one pin (6,20,25,30,37) to the second hook part (8,14,18,23,28) is approximately half of the width of the strips (3).
4. A connector according to claim 1 or 2, characterized in that the distance from the axis of the at least one pin (6,20,25,30,37) to the second hook part (8,14,18,23,28) is larger than half of the width of the strips (3).

5. A connector according to claim 1 or 2, characterized in that the distance from the axis of the at least one pin (6,20,25,30,37) to the second hook part (8,14,18,23,28) is less than half of the width of the strips (3).
- 5 6. A connector according to any of the claims 1 - 5, characterized in that the first hook part (5,11,17,22,27) and the third hook part (9,15,19,24,29) form an angle with each other.
- 10 7. A connector according to claim 6, characterized in that the angle is 0°.
- 15 8. A connector according to claim 6, characterized in that the angle is larger than 0°.
- 20 9. A connector according to any of the claims 1 - 8, characterized in that the connector (21) has two hooks (22,23,24) extending at each their side of the pin (25).
- 25 10. A connector according to any of the claims 1 - 8, characterized in that the connector (26) has four hooks (27,28,29), and that their first hook parts (27) forms an angle of 90° with each other.
- 30 11. A connector according to any of the claims 1 - 9, characterized in that the connector (36) has more than one pin (37).
- 35 12. A connector according to any of the claims 1 - 11, characterized in that the connector (31) has two pins (6) attached at each their side of a first hook part (5), two second hook parts (8) attached at each their side of the first hook part and two third hook parts (9) attached to each their second hook parts.

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13. A connector according to any of the claims 1 - 12,  
characterized in that the at least one pin (6,20,25,30,37)  
is shaped with a diameter a little larger than the  
diameter of the perforations (4) of the strips (3) and at  
least one mainly circumferential recess (32).
- 5
14. A connector according to any of the claims 1 - 13,  
characterized in that the at least one hook is attached to  
the at least one pin (6,20,25,30,37) with e.g. a screw  
joint (33).
- 10



**Connector for connecting a number of strips****ABSTRACT**

5 A connector for detachably interconnecting a number of strips (3), each of which has at least one perforation (4) and which in at least one mutual connection position is flush with the perforations (4) in the other strips (3). The connector (1,10,16,21,26,31,36) comprises at least one pin 10 (6,20,25,30,37) and at least one hook (5,8,9;11,14,15;17,18,19; 22,23,24;27,28,29) attached to the at least one pin, the at least one pin is engaging the flush perforations in the strips in the connected state of these at the same time as the at least one hook is encompassing the strips, and the strips are 15 detachably interconnected only by means of said at least one pin and said at least one hook. The connector has a simple construction and is able to easily and quickly connect two or more strips immediately in positions where co-operating perforations are flush with each other without the need to 20 first pass the strips through the connector.

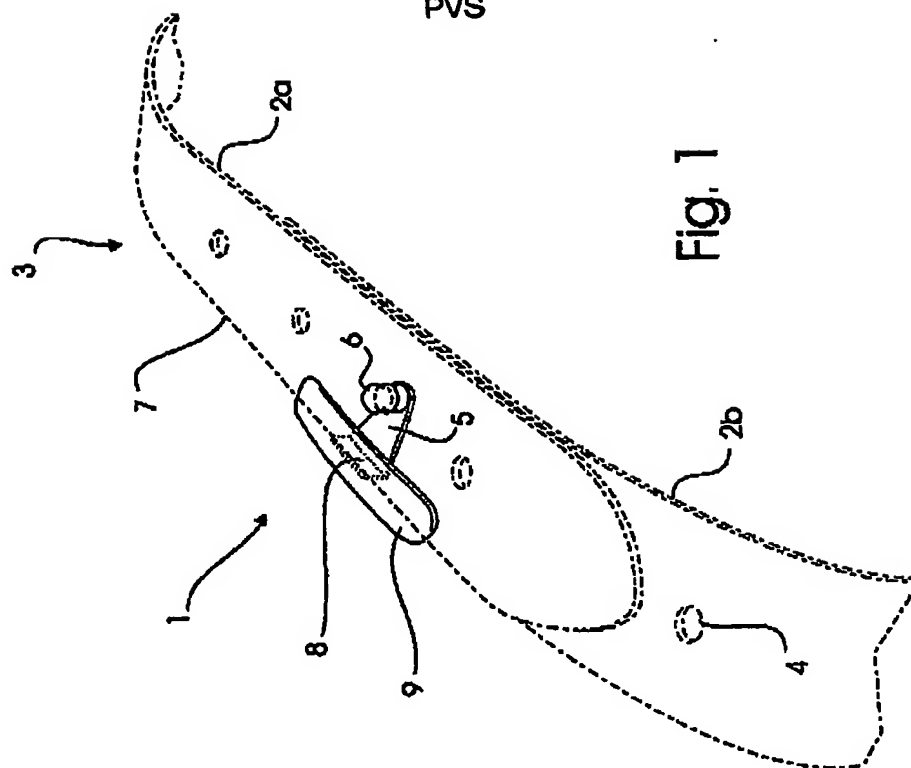
Fig. 7

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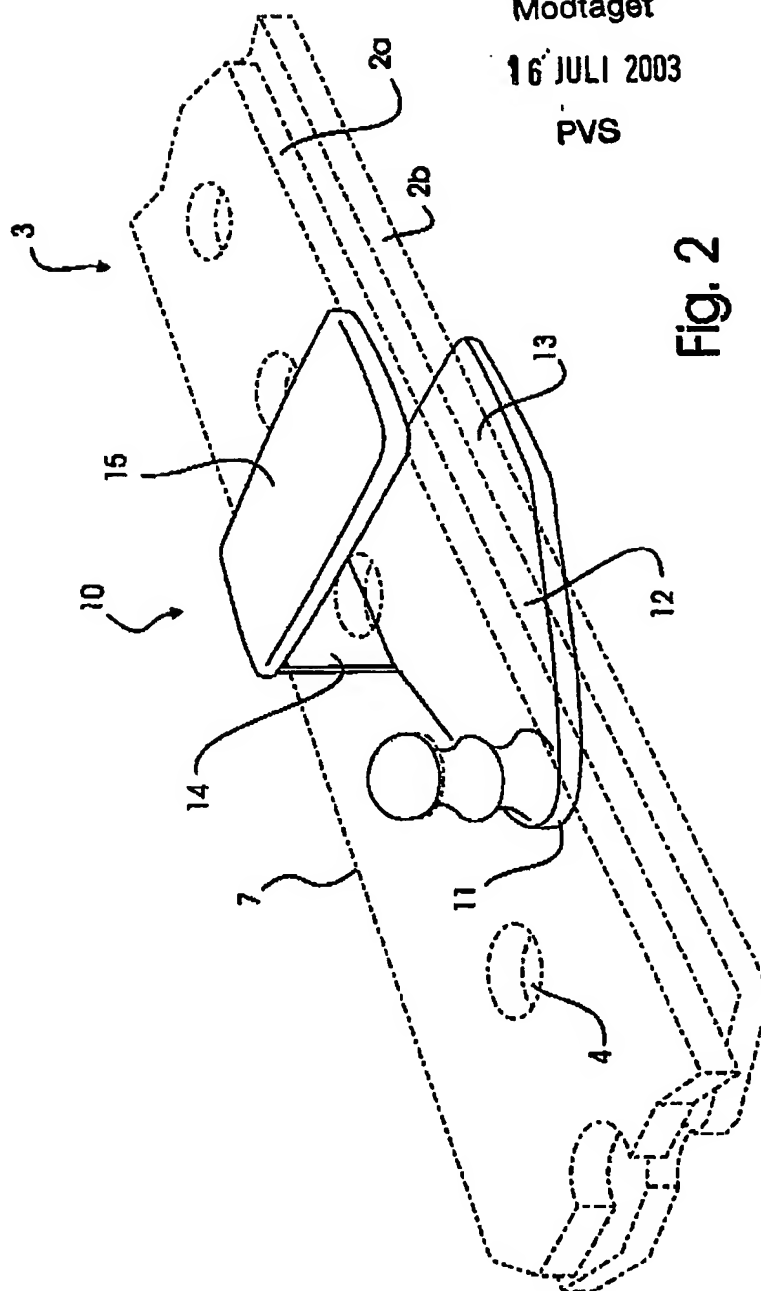


Fig. 2

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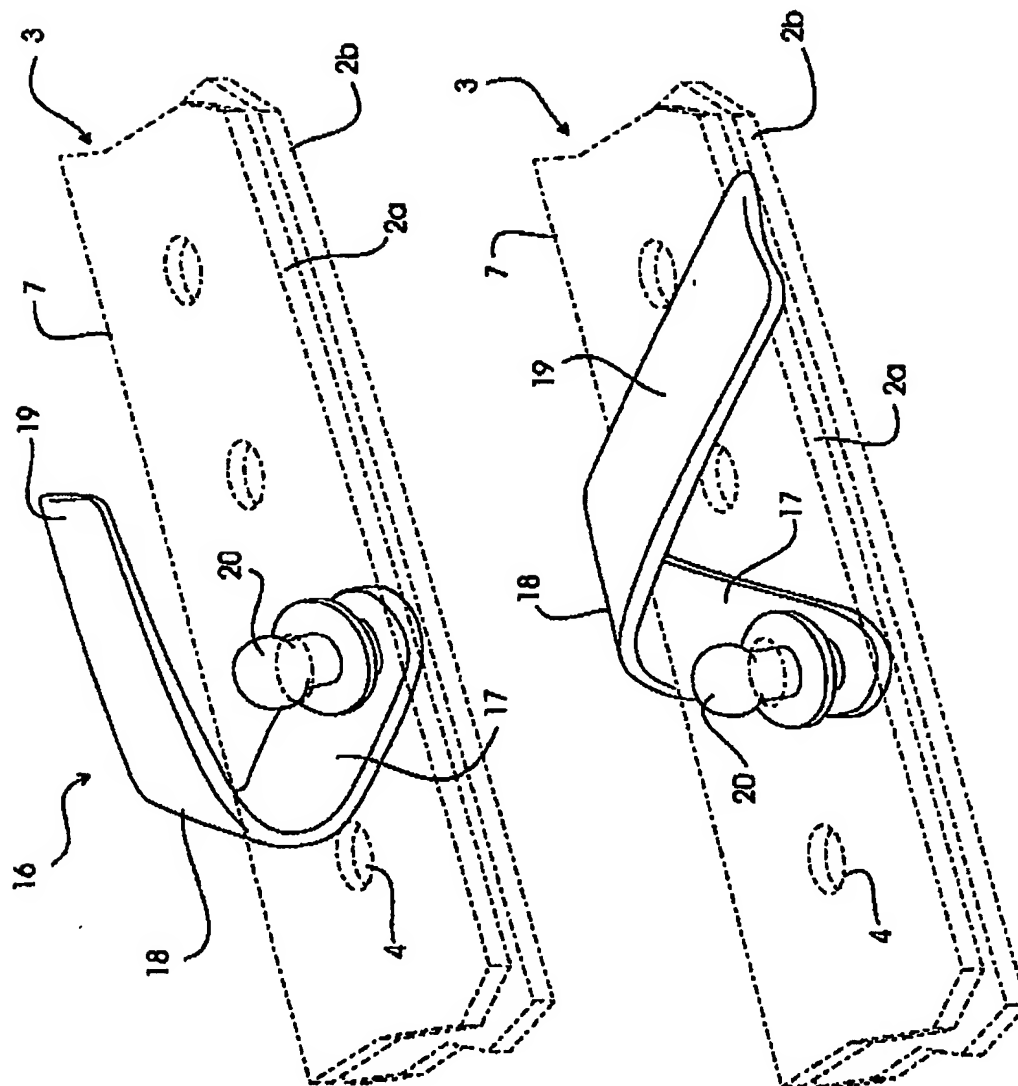
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Fig. 3

Fig. 4



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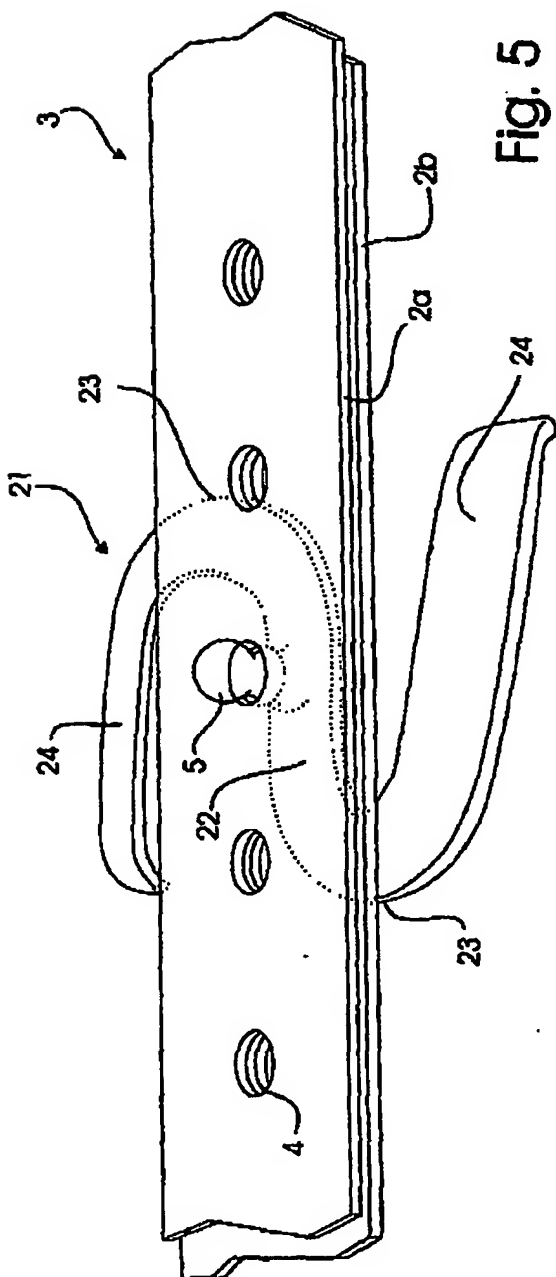


Fig. 5

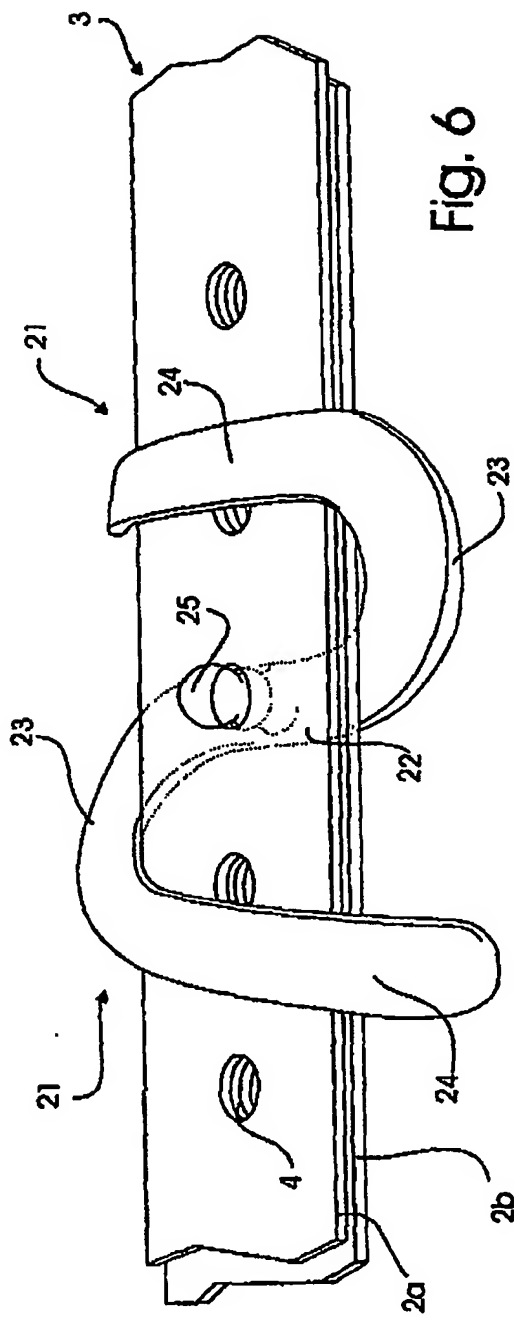


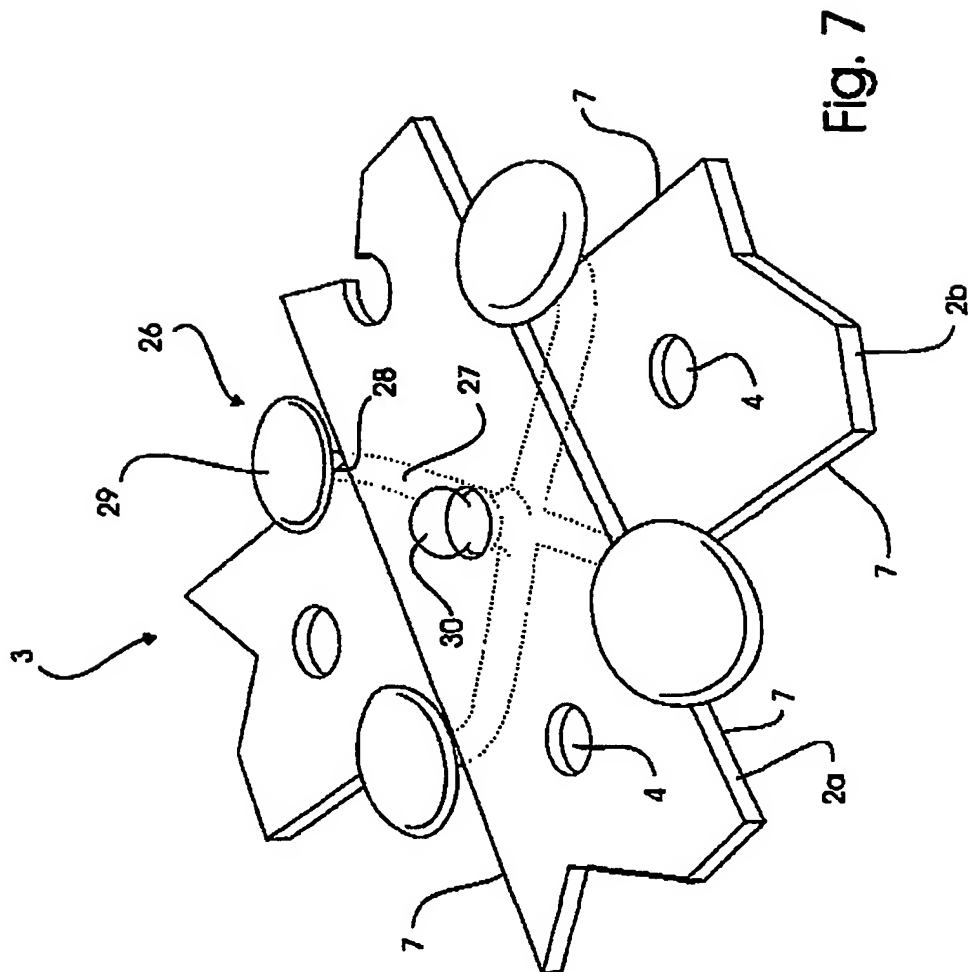
Fig. 6

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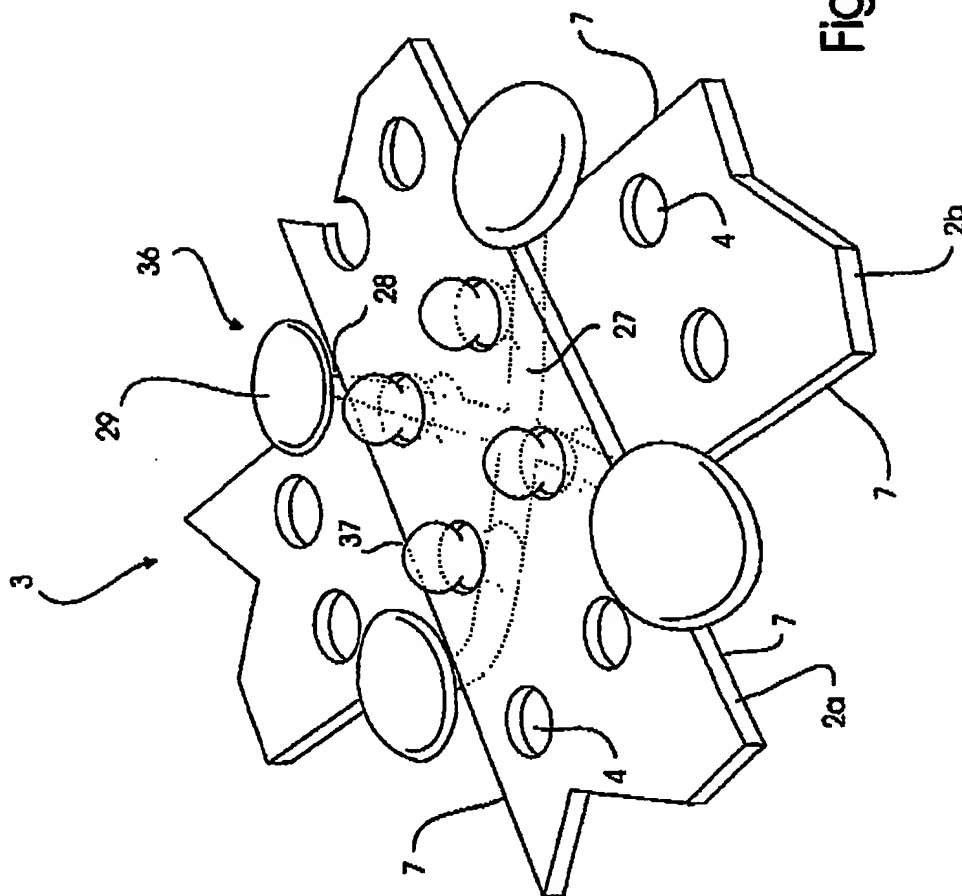
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Fig. 10





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